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IN THE

Supreme Court of the United States

OCTOBER TERM 1971.

No. 71-485.

ROBERT GOTTSCHALK, ACTING COMMISSIONER OF PATENTS,

Petitioner,

v.

GARY R. BENSON AND ARTHUR C. TABBOT,

Respondents.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS.

BRIEF AMICUS CURIAE FOR MOBIL OIL CORPORATION.

Mobil Oil Corporation respectfully submits this brief with the consent of both parties. The letters of consent have been filed with the Clerk of this Court.

I.

QUESTION PRESENTED.

Whether the Court of Customs and Patent Appeals erred in finding the method of operation of a general purpose computer as set forth by claims 8 and 13 comprises subject matter which may be patented under 35 U. S. C. §§ 100 and 101.

II.

THE INTEREST OF AMICUS CURIAE.

Mobil Oil Corporation is a corporation originally organized August 10, 1882 under the laws of New York. Its principal business is the exploration for, production, refining and marketing of petroleum hydrocarbon on a worldwide basis. As a supporting activity Mobil has several research facilities in different parts of the country utilized for original research to develop the full potential of computer applications in its various fields of activity. Mobil's computers are in twenty-four hour a day use in processing seismic signals to identify oil bearing subsurface formations and in operation of its refineries to increase yield and to enhance quality of products therefrom. Its large expenditures in research and practical applications involving computer operation have given rise to proprietary information deemed of great value.

In order to determine company policy as to how best to protect its proprietary rights in the new methods of operation and control of computers and their use as component parts of other systems, Mobil appealed adverse decisions of the Patent Office rejecting patent claims on this technology. Mobil asked the Court of Customs and Patent Appeals to decide whether the Patent Office had changed its past practice and was correct in denying patent protection to new and different operations of computers. If the answer were to be affirmative, a company policy of seeking trade secret protection would be indicated; if negative, it would continue to publish the results of its research under the protection provided by the patent system.

III.

THE PURPOSE OF THIS BRIEF.

As a result of Mobil's appeals and the appeals of others to the court below, a body of law consistent with prior decisions of this Court has been developed. The court below has imposed safeguards to avoid overclaiming by applicants. It has insisted on full and complete disclosures of automatic systems, with claims properly drafted to define subject matter within 35 U. S. C. §§ 100 and 101 and meeting the requirements of 35 U. S. C. § 112.

Mobil's primary purpose here is to show that the recent decisions of the Court of Customs and Patent Appeals on programming technology do conform to prior decisions of this Court and statutory authority. Over the years this Court has developed case law in fulfillment of the Constitutional mandate by granting for limited times the exclusive right to discoveries in new fields of technology. As these new and previously unknown fields of technology came into being, this Court was faced with the problem of whether the new subject matter was patentable and with the question of the breadth of the claims to be granted in each new field.

This brief presents the development by this Court of the law with respect to new processes now defined in 35 U. S. C. § 100:

> (b) "The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material."

The accepted patentability of programming technology and the leading cases of the C. C. P. A. involving new operations of computers is then presented. Because this appeal

is from an *ex parte* proceeding in the Patent Office, the record is unduly limited. Therefore, an analysis of other C. C. P. A. decisions involving new and unobvious uses of computers is necessary to provide a somewhat broader base for a review of the instant decision. These other decisions also demonstrate the care with which the C. C. P. A. has considered the subject matter.

A discussion of the *Benson and Tabbot* case itself includes a description of their method of code conversion in Appendix V of this brief. One of the key points of this appeal is the limited scope of the rejection. The Benson and Tabbot application is rejected only under 35 U. S. C. § 101, to the exclusion of other sections of the patent statutes.

Finally, this brief deals with the practice in other countries with regard to patenting programming technology.

IV.

THIS COURT DEVELOPED THE LAW OF PATENTABLE PROCESSES TO ACCOMMODATE NEW TECHNOLOGIES.

Methods and processes have been recognized as patentable subject matter since the inception of our patent system.

An early text by Willard Phillips, *The Law of Patents for Inventions*, 1837, at pages 82 et seq., provides a most interesting analysis of the then understood differences between methods and processes. Phillips suggests at page 94 that the word method has a broader signification than process. Immediately following, there is a discussion of the difference between a principle and the use or application of that principle in a useful art. The book is outstanding in its summary of earlier decisions having to do with the development of the law as of that very early date. Thus at page 100 " 'By the principles of the machine,' says the same judge, in another case, 'is meant the *modus operandi*,

the peculiar device or manner of producing any given effect.' ", citing *Whittemore v. Cutter*, 1 Gallison, 478. Phillips cites many cases to the effect that the *application* of a *principle* represents patentable subjects matter. More specifically, at page 102:

> "If by *application* be meant the mode of *operating*, or the mechanical combinations, means, or instruments, by which a principle or theory is carried into operation, in this sense, the new application of a theory or principle, may be the subject of a patent."

Again, at page 103:

> "Thus, Mr. Justice Johnson says, 'the legal title to a patent consists not in a principle merely, but in an application of a principle, whether previously in existence or not, to some new and useful purpose' (*Whitney v. Carter*, Fessenden's Pat. 130)." (All emphasis in original.)

Mr. Phillips' understanding of the law of patentable subject matter is substantiated by the following decisions of this Court.

1. The Art of Telegraphy.

O'Reilly v. Morse
56 U. S. 62 (1853)

This case brought before the Court the inventions of Samuel Morse having to do with the new art of telegraphy which created a new industry in a new field of technology. All claims before the Court except claim 8 were held valid and infringed. Of these claims, claims 6 and 8 are here relevant.

> "Sixth. I also claim as my invention the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, substantially as herein set forth

and illustrated, in combination with machinery for recording them, as signals for telegraphic purposes.

"Eighth. I do not propose to limit myself to the specific machinery, or parts of machinery, described in the foregoing specifications and claims; the essence of my invention being the use of the motive power of the electric or galvanic current, which I call electro-magnetism, however developed, for making or printing intelligible characters, letters, or signs, at any distances, being a new application of that power, of which I claim to be the first inventor or discoverer." (56 U. S. 86)

Claim 6 is of interest here since this Court in 1853 recognized that in this new art the use of a code or system of signs in combination with machinery for recording them represented patentable subject matter.

The eighth claim was, as stated by the Court, too broad and not warranted by law (56 U. S. 113). Thus overclaiming was the basis of the ruling of invalidity.

The Court contrasted the overclaiming by Morse with the proper claim by one Neilson (56 U. S. 114-116). The latter had limited his process to the heating of the air by a device intermediate the blower and the furnace. Neilson had not claimed merely the discovery that hot air would promote ignition better than cold. He properly claimed a receptacle in whatever form arranged to heat the air on its way from the blower to the furnace. Thus this Court illustrated the difference between proper scope of claims and overclaiming.

2. The Art of Producing Flour.

Cochrane v. Deener
94 U. S. 780 (1876)

In this case the defendant had not used the same apparatus as disclosed in the plaintiff's Cochrane patents. There-

fore, the question was squarely presented as to whether the defendant had employed the process specified by the claim and, in particular, the extent that a process must be limited to the particular apparatus disclosed. In answering this question, the Court first stated a premise:

> "That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. If one of the steps of a process be that a certain substance is to be reduced to a powder, it may not be at all material what instrument or machinery is used to effect that object, whether a hammer, a pestle and mortar, or a mill. Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process being the same." (94 U. S. 787, 788)

This was followed by an oft-quoted definition of a process in terms of the fact situation before the Court:

> "A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence." (94 U. S. 788)

The foregoing quotations, though they seem clear enough, gave rise to questions raised in later cases as to whether the Court was setting up limits applicable to the facts of the case without foreclosing the applicability of a broader definition in the context of a different fact situation.

3. The Art of Manufacturing Fat Acids in Glycerine.

Tilghman v. Proctor
102 U. S. 707 (1880)

In this decision the Court clarified its views on process claims.

Mr. Justice Bradley described the patented invention as follows:

> "Tilghman's discovery was made in 1853, and was, in brief, this: 'That the fat acids can be separated from glycerine, without injury to the latter, by the single and simple process of subjecting the neutral fat, whilst in intimate mixture with water, to a high degree of heat under sufficient pressure to prevent the water from being converted into steam without the employment of any alkali or sulphuric acid, or other saponifying agent; . . .' ". (102 U. S. 712-13)

Whether process claims were applicable to this new technological development was answered as follows:

> "What did Tilghman discover? And what did he, in terms, claim by his patent? He discovered that fat can be dissolved into its constituent elements by the use of water alone under a high degree of heat and pressure; and he patented *the process* of 'manufacturing fat acids and glycerine from fatty bodies by the action of water at a high temperature and pressure.'

Had the process been known and used before, and not been Tilghman's invention, he could not then have claimed anything more than the particular apparatus described in his patent; but being the inventor of the process, as we are satisfied was the fact, he was entitled to claim it in the manner he did.

"That a patent can be granted for a process, there can be no doubt. The patent law is not confined to new machines and new compositions of matter, but extends to any new and useful art or manufacture." (Emphasis by the Court.) (102 U. S. 721-22)

Mr. Justice Bradley continued to present his own broad discussion of the nature of an invention in an art or process:

"It seems to us that this clear and exact summary of the law affords the key to almost every case that can arise. 'Whoever discovers that a certain useful result will be produced in any art by the use of certain means is entitled to a patent for it, provided he specifies the means.' But everything turns on the force and meaning of the word 'means.' It is very certain that the means need not be a machine, or an apparatus; it may, as the court says, be a *process*. A machine is a thing. A process is an act, or a mode of acting. The one is visible to the eye,—an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed. 'Either may be the means of producing a useful result.'" (Emphasis by the Court.) (102 U. S. 728)

4. The Art of Telephony.

The Telephone Cases
126 U. S. 1 (1887)

Famous claim 5 of the Bell patent reads as follows:

"5. The method of, and apparatus for, transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth." (126 U. S. 531)

The opinion by Mr. Justice Waite states:

"In this art—or, what is the same thing under the patent law, this process, this way of transmitting speech—electricity, one of the forces of nature, is employed; but electricity, left to itself, will not do what is wanted. The art consists in so controlling the force as to make it accomplish the purpose. It had long been believed that if the vibrations of air caused by the voice in speaking could be reproduced at a distance by means of electricity, the speech itself would be reproduced and understood. How to do it was the question.

Bell discovered that it could be done by gradually changing the intensity of a continuous electric current, so as to make it correspond exactly to the changes in the density of the air caused by the sound of the voice. This was his art." (126 U. S. 532)

That a patentable method need not necessarily involve a change in state of matter, as in the process involved in *Cochrane v. Deener*, is made abundantly clear by this Court in the statement:

"What Bell claims is the art of creating changes of intensity in a continuous current of electricity, exactly corresponding to the changes of density in the air caused by the vibrations which accompany vocal or other sounds, and of using that electrical condition thus created for sending and receiving articulate speech telegraphically. For that, among other things, his patent of 1876 was in our opinion issued; and the point to be decided is, whether as such a patent it can be sustained." (126 U. S. 533-4)

The Supreme Court sustained the patent. They did so after a consideration of *Cochrane v. Deener* and other authorities on this point as summarized in the statement:

"Thus, an art—a process—which is useful, is as much the subject of a patent, as a machine, manufacture, or composition of matter. Of this there can be no doubt, and it is abundantly supported by authority. *Corning v. Burden*, 15 How. 252,267; *Cochrane v. Deener*, 94 U. S. 780,787,788; *Tilghman v. Proctor*, 102 U. S. 707, 722, 724, 725; *Fermentation Co. v. Maus*, 122 U. S. 413, 427, 428." (126 U. S. 533)

5. The Art of Making Pulleys.

Risdon Iron and Locomotive Works v. Medart
158 U. S. 68 (1895)

Philip and William Medart sued the Risdon Company for infringement of three of their patents on pulleys. In accordance with Medart's alleged invention, the pulley center was precisely centered, the ends of the spokes were ground concentrically with the axis, the face of the rim was ground concentric with the axis, and the edges of the rim were ground to square them. As a result, the pulley was more balanced, faultless in shape, stronger and more

durable. While recognizing these desirable characteristics, the opinion of Mr. Justice Brown clearly states that they did not result from a new discovery of the patentee but rather were the result of superior workmanship (158 U. S. 79). Accordingly, the Court found all three Medart patents to be invalid.

In reaching this conclusion, the opinion discusses in length the unpatentability of processes which are "the mere function of a machine." The question of the patentability of processes which are "the inherent function of a machine" has been repeatedly argued ever since.[1] At that time, the opinion in *Risdon* cast doubt on the patentability of all processes performed by machines. This doubt was resolved in favor of patentability by later decisions of this Court.

This is thoroughly discussed in Whitney, "Patentable Processes", 19 Harv. L. Rev. 30 (1906). Mr. Whitney's interpretation of *Cochrane v. Deener*, 94 U. S. 780 (1876) concludes that a process is not to be limited to a series of acts upon a material to be transformed and reduced to a different state or thing.

Then Mr. Whitney discusses the period of time following *Risdon Locomotive Works v. Medart*, during which early mechanical processes were considered unpatentable. He observed, pages 34, 35:

> "More concretely, the function of every machine is to perform some definite process—some act, or series of acts—upon a material object, by which it is transformed into a different state or thing. It follows that this process is not simply the function of the machine.

---

1. The C. C. P. A. recently overruled several of its own prior decisions affirming rejections of claims as being the inherent functions of the machine. *Application of Tarczy-Hornoch*, 397 F. 2d 856 (C. C. P. A. 1968). This rejection is not presented in this case.

The two are entirely distinct entities. The one, as stated by Mr. Justice Bradley in the Tilghman Case, 'is a conception of the mind, seen only by its effects when being executed or performed.' The other is the production of those physical effects upon a material object."

Mr. Whitney was well grounded in the process by which inventions come into being. He observed, pages 35, 36:

"In the natural course of development, many processes of manufacture are first performed by hand, then partly by machinery and partly by hand, and, finally, automatically, by a machine. For others, machines have not yet been devised; and such processes must be performed wholly or in part by hand. Still other processes are beyond the power or skill of the hand, and must be performed, if at all, by a machine. But, however carried into effect, the process is still a process; and it matters not whether it was first practiced by hand, or was discovered and reduced to practice only in connection with the development of a machine. It does not cease to be such because it is, or must be, performed by mechanical means."

The paper concludes with a penetrating analysis as applicable today as it was in 1906:

"The patentability of a new process should, under our laws, be determined solely by ascertaining whether such process, as distinguished from the means by which it is to be performed, is new and useful, and amounts to an invention or discovery. If it meets this test successfully, the process fulfills every requirement, and is the proper subject of a patent."

This Court's decision in *Expanded Metal Company v. Bradford*, 214 U. S. 366 (1909) seems thoroughly to have adopted Mr. Whitney's analysis.

6. The Art of Expanding Sheet Metal.

Expanded Metal Company v. Bradford
214 U. S. 366 (1909)

In this case the Supreme Court had again under consideration the nature and character of method and process claims. Expanded sheet metal was old, but the patentee, Golding, had come up with a new way of making expanded metal. He devised a method by means of which the metal could be simultaneously cut and expanded.

This Court laid to rest any doubt as to the patentability of mechanical processes by its conclusion:

> "We therefore reach the conclusion that an invention or discovery of a process or method involving mechanical operations, and producing a new and useful result, may be within the protection of the Federal statute, and entitle the inventor to a patent for his discovery." (214 U. S. 385, 386)

The quotation from the opinion of Mr. Justice Waite is particularly relevant here:

> "It is lastly contended, and this is perhaps the most important question in the case, that in view of the former declarations and opinions of this court, what is termed a process patent relates only to such as are produced by chemical action, or by the operation or application of some similar elemental action, and that such processes do not include methods or means which are affected by mere mechanical combinations, and a part of the language used in *Corning v. Burden*, 15

How. 252, and *Risdon Locomotive Works v. Medart*, 158 U. S. 68, is seized upon in support of this contention. We have no disposition to question the decision in those cases." (214 U. S. 381, 382)

After discussing *Tilghman v. Proctor* noted above, Mr. Justice Waite, said:

"That this court did not intend to limit process patents to those showing chemical action or similar elemental changes is shown by subsequent cases in this court." (214 U. S. 384)

Mr. Justice Waite then quoted from the opinion in *Westinghouse v. Boyden Power Brake Company*, 170 U. S. 537 (1898), as follows:

"These cases [158 U. S. 68, and 103 U. S. 461] assume, although they do not expressly decide, that a process to be patentable must involve a chemical or other similar elemental action, and it may be still regarded as an open question whether the patentability of processes extends beyond this class of inventions." (214 U. S. 384)

He added these significant words:

"Where the process is simply the function or operative effect of a machine, the above cases are conclusive against its patentability; but where it is one which, though ordinarily and most successfully performed by machinery, may also be performed by simple manipulation, such, for instance, as the folding of paper in a peculiar way for the manufacture of paper bags, or a new method of weaving a hammock, there are cases to the effect that such a process is patentable, though none of the powers of nature be invoked to aid in producing

the result. *Eastern Paper Bag Co. v. Standard Paper Bag Co.*, 30 Fed. Rep. 63; *Union Paper Bag Machine Co. v. Waterbury*, 39 Fed. Rep. 389; *Travers v. Am. Cordage Co.*, 64 Fed. Rep. 771." (214 U. S. 384, 385)

It is not the hammock or paper bag that is patented, it is the process producing them.

7. The Art of Hatching Eggs.

Waxham v. Smith
294 U. S. 20 (1935)

The Supreme Court, speaking through Mr. Justice Stone, referred with approval to the Expanded Metal case and said:

"By the use of materials in a particular manner he secured the performance of the function by a means which had never occurred in nature, and had not been anticipated by the prior art; this is a patentable method or process. *Corning v. Burden*, 15 How. 252, 267, 268; *Risdon Iron & Locomotive Works v. Medart, supra*, 77; *Cochrane v. Deener*, 94 U. S. 780, 788. A method, which may be patented irrespective of the particular form of the mechanism which may be availed of for carrying it into operation, is not to be rejected as 'functional,' merely because the specifications show a machine capable of using it. *Expanded Metal Co. v. Bradford*, 214 U. S. 366, 382-386; *Cochrane v. Deener, supra*, 787, 788; cf. *Holland Furniture Co. v. Perkins Glue Co.*, 277 U. S. 245, 255, 256." (294 U. S. 22)

V.

PROGRAM CONTROL OF MACHINES IS A TECHNOLOGY WHICH IS PATENTABLE UNDER THE LAW DEVELOPED BY THIS COURT.

1. The Analog System.

Program control is as old as automatic machines. Examples abound everywhere. The housewife sets the temperature for the oven and the heating elements under programmed control maintain the selected temperature. If the heating is to be terminated after a lapse of time, time-control is included in the program. Elevators proceed to a selected floor, the doors are opened, closed, and returned to another selected floor under automatic control of a program. Automation has been the hallmark of production in this country. In such control systems, and in many computing systems of the analog type, use is made of generated physical quantities such as shaft rotations, electrical voltages, and cam-operated switches. Systems of the foregoing type have from the beginning of the patent system been patentable. Multiplication, division, subtraction and integration are common operations in systems of the foregoing kind.[2]

---

2. In an early decision, the First Circuit Court of Appeals had before it a patent for a computing machine. The patent related to additive subtraction, a technique by which adding machines may be utilized to perform problems of subtraction. As the Court described additive subtraction, it consisted of two distinct operations:

"First, the operation of finding the complement of the subtrahend by subtracting it from a higher power of 10; and, second, the adding of this complement to the minuend. The only part of additive subtraction which can be performed mechanically upon an adding machine is the second step in the process, which is merely an ordinary sum in addition. The performance of this second step results in the error of .1 on the reading line of the machine, and the whole scope and purpose of the Felt in-

2. The Digital System.

The digital system uses discrete quantities instead of the continuous quantities used in analog computers. These quantities are usually in the binary system, with one digit represented by the "On" state of an electronic device and the other by the "Off" state. The numbers or words utilized in digital systems can extend to any desired significant figure for any desired degree of accuracy. They can reproduce rapidly varying quantities whether mechanical, electrical, or chemical in character. The usefulness of the digital computer is only limited by economic considerations since a large-scale digital computer can accomplish all of the operational functions of an analog system.

A *special purpose digital* computer is one which has a single mode of operation and is dedicated to a single application.[3]

General purpose computers use a stored program which is easily changed for different applications. General purpose digital computers have been properly characterized as "merely a 'warehouse of unrelated parts' ". It was so described by the Commissioner of Patents in his Guidelines of August 2, 1966, 829 Official Gazette 1. There the Commissioner said:

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2. (Cont'd.)

vention is to prevent mechanically the occurrence of this error." (145 Fed. 335)

The Court then proceeded to examine the patent and the prior art and found that the claims were directed to a new and unobvious invention and held them valid and infringed. *Comptograph Co. v. Mechanical Accountant Co.*, 145 Fed. 331 (1st Cir. 1906).

3. The first electronic digital computer was a special purpose machine for computing gun fire tables. It was developed in 1946 at the University of Pennsylvania and was known as ENIAC. It used a program in the form of a wire patch board in which the wires had to be physically changed each time the program was changed (see *Sperry Rand Corporation v. Bell Telephone Laboratories, Incorporated*, 208 F. Sup. 598 (S. D. N. Y. 1962) appeal dismissed, 317 F. 2d 491 (2nd Cir. 1963); the ENIAC patent is No. 3,120,606).

"A programable machine, such as a general purpose computer, with its various parts not interconnected to perform any useful combined operation is merely a 'warehouse' of unrelated parts. It may well be that the same machine, with a program device correctly related thereto, may yield a novel and useful machine combination due to the new interrelation of parts. In other words, the fact that such a prior art machine can have its parts interrelated by a program device in a new way to carry out machine functions of a specialized character may well result in a new patentable combination, unless there is a prior art teaching that would make the interrelations and results thereof obvious."

Similarly, new methods of operation performed by the machine with the new program may be patentable. The amici curiae in support of the Petitioner seem to argue that this case involves the patentability of computer programs *per se*. It does not. Benson and Tabbot claim the new method performed by a general purpose computer with their program.

The general purpose computer plus its program is the most versatile machine yet invented. With each different program it is converted into a new and different machine in terms of the operations performed and the results achieved. Whether a new operation of the machine is patentable depends upon whether the new operation, alone or as part of an overall system, is unobvious and represents an advance in the useful arts in which it is utilized.[4]

4. For an example in which a new operation is programmed in an automatic control sytem including a computer, see U. S. patent 3,339,457, Pun. The first page is reproduced as Appendix I. This patent was selected as an example by the Commissioner of Patents to illustrate a new format for the first page of patents, as announced in 877 O. G. 1. The Pun patent describes the operation of a program-controlled computer which in turn controls the aiming of a gun.

The question of the patentability of a program *per se* is not involved in this case. Neither is the question of whether an equation *per se* is patentable, nor whether a principle of nature is patentable. Such questions were not before the Court of Customs and Patent Appeals preceding and following its decision in the instant case. As will now be demonstrated that Court scrupulously applied the case law as annunciated by this Court in the decisions referred to above.

VI.

THE COURT BELOW FOLLOWED THE LAW DEVELOPED BY THIS COURT IN THE PRATER AND WEI DECISIONS.

Application of Prater, 415 F. 2d 1378 (C. C. P. A. 1968) and Application of Prater, 415 F. 2d 1393 (C. C. P. A. 1969)

In the decision on the application of Prater and Wei, and in many of the subsequent cases, the court below considered Patent Office rejections based upon 35 U. S. C. §§ 100, 101, 102, 103 and 112. Thus there were rejections based upon anticipation, obviousness, and statutory subject matter, as well as whether or not the claims met the requirements of section 112 in particularly pointing out and distinctly claiming the invention. In the case now before this Court a rejection based solely on 35 U. S. C. § 101 is under consideration.

1. The Art of Spectrographic Analysis.

Prater and Wei discovered how to achieve a spectrographic analysis of a mixture of gases to determine with increased accuracy of measurement the concentration of

each gas in a mixture. Their discovery was the relationship between error magnification and the size of the determinant of each subset of a plurality of sets of simultaneous equations. Their invention resided in an analog system or a properly programmed digital computer which would not only make the search for the set of equations to be utilized, but also determine the concentration of each of the constituents in the gaseous mixture. Their claims were directed to the manner of making use of the discovery by a new and different operation of a computer, whether analog or digital.

2. The First Prater and Wei Decision of November 20, 1968, 415 F. 2d 1378.

The arguments in this case were heard by Chief Judge Worley, Associate Judges Rich, Smith and Almond and Senior District Judge Kirkpatrick from the Eastern District of Pennsylvania.

Recognizing the importance of the issues involved, the court, Opinion by Judge Smith, not only considered the reasoning of the Board of Appeals but reviewed in depth the several arguments on which the Examiner based his rejection of all of the Prater and Wei claims. The Examiner recognized that Prater and Wei were entitled to patent coverage on their analog embodiment of their system. However, the Examiner argued that if the claims would embrace a properly programmed general purpose digital computer, then Prater and Wei would not be entitled to such claims notwithstanding the fact that they had disclosed that for certain applications the use of the ditigtal computer would be indicated. (For complicated problems, Prater and Wei disclosed that the general purpose digital computer would be preferred over the analog computer.)

The Patent Office argued that the principal question presented to the court for decision was whether claims

could be interpreted to read on a mental process. If so, they would be unpatentable as falling outside the statutory classes of Sections 100 and 101. To support this position there was reliance upon the case of *In re Abrams*, 188 F. 2d 165 (C. C. P. A. 1951). The court thoroughly studied the *Abrams* case as well as the case of *In re Shao Wen Yuan*, 188 F. 2d 377 (C. C. P. A. 1951). The decision presents reproductions of the drawings from the *Abrams* case together with a discussion of the issues involved. The court properly concluded that in *Abrams* the disclosure was mental in character. No automatic system was disclosed. It was necessary for the operator to utilize the procedures disclosed by Abrams and to think about the various steps and to interpret the results of each step in order to proceed with the next one. The same conclusions were drawn in respect of the decisions in *Halliburton Oil Well Cementing Co. v. Walker*, 146 F. 2d 817 (9th Cir. 1944) and *Don Lee Inc. v. Walker*, 61 F. 2d 58 (9th Cir. 1932).

As part of the thorough consideration of the questions involved, Judge Smith in his Opinion beginning page 1387 reviewed the development of the patent law from its constitutional origin and in particular the import of the decision of this Court in *Cochrane v. Deener*, 94 U. S. 780 (1876). The conclusion was properly reached that this Court in *Cochrane v. Deener* did not set up limits in respect of process patentability but intended and explicitly said:

> "That a process may be patentable irrespective of the particular form of the instrumentalities used,". (94 U. S. 787)

The intended breadth of 35 U. S. C. § 101 was made evident by Judge Smith's reference to two cases, *Smith v. Snow*, 294 U. S. 1 (1934) and *Waxham v. Smith*, 294 U. S. 20 (1935). In these cases, this court indicated that the

process met the requirements of patentability because the performance of a function which had never occurred in nature, which had not been anticipated by the prior art, was attained.

The court in *Prater and Wei* then concluded:

> "This distinction from Abrams (that his process could only be performed in the mind as far as the disclosure was concerned) leads us to our present holding which is that patent protection for a process disclosed as being a sequence or combination of steps, capable of performance without human intervention and directed to an industrial technology—'useful art' within the intendment of the constitution—is not precluded by the mere fact that the process could alternatively be carried out by mental steps." (415 F. 2d 1389)

Thus the rejection of the process claims was reversed. Following a brief discussion of the apparatus claim, its rejection was also reversed.

3. The Decision in Prater and Wei of August 14, 1969, 415 F. 2d 1393, After Rehearing.

After grant of the petition by the Patent Office for rehearing, the court granted permission for amici curiae to file briefs and to participate in the oral argument. Briefs were presented by Bell Telephone Laboratories, International Business Machines Corporation (IBM), Honeywell,, Inc., Applied Data Research Inc., and the Association of Independent Software Companies (Software Association).

The court comprised Chief Judge Worley, Judge Maguire, Senior District Judge, District of Columbia and Associate Judges Rich, Almond and Baldwin. The Opinion was by Judge Baldwin.

The court again found that the fact situation presented was not controlled by *Abrams, Yuan,* or *Cochrane v. Deener.* Besides adopting Judge Smith's more detailed analysis of the *Abrams* case, the Opinion again reviewed that case together with *Yuan* and *Cochrane v. Deener.*

The key to the decision on Rehearing lies in the finding of the court, page 1403:

> "that there is no dispute, as between the principal parties, that appellants have *disclosed* a patentable statutory process." (Emphasis by Court.)

The opinion by Judge Baldwin then points out that there remains a question of whether Prater and Wei were entitled to a claim broad enough to cover a mental process coupled only with pencil and paper markings as well as the operation of a properly programmed general purpose digital computer and the operation of an analog device.

The Court held to be fatal the attorney's admission that claim 9 could, absent the specification, be read on a "pencil and paper execution". Since claim 9 was thus found to read on subject matter for which Prater and Wei did not seek coverage, this admission was held to run afoul of Section 112. Accordingly there was affirmance by the court of the Patent Office rejection of all of the method claims as not meeting the requirements of Section 112.

Apparatus claim 10 however fell into an entirely different category. For an apparatus claim, any "mental steps" issue is absent. Claim 10 was a typical means-plus-function claim expressly permitted by the third paragraph of 35 U. S. C. § 112. The C. C. P. A. reversed the Patent Office rejection of this claim.

VII.

THE LATER DECISIONS OF THE COURT OF CUSTOMS AND PATENT APPEALS FOLLOWED THE LAW DEVELOPED BY THIS COURT TO ACCOMMODATE OTHER NEW TECHNOLOGIES.

1. The Art of Producing Isometric Drawings.

Application of Bernhart
417 F. 2d 1395 (C. C. P. A. 1969)

This case related to the applicability of a general purpose computer in producing isometric drawings by a plotter under the control of a general purpose computer. The ability of the Patent Office to search such subject matter is evident from its citation of the relevant prior art. The recognition by the court of that prior art as anticipatory is evidenced by its affirmance of the rejection of claims 13 and 18. The court reversed the Patent Office in respect of claims 19-21 because the prior art was not anticipatory and the claims met the test of statutory subject matter.

The reasoning of the court as set forth in the opinion by Judge Lane includes the adoption of the Commissioner's position of 1966, *supra*, by pointing out that if the machine:

> "is programmed in a certain new and unobvious way, it is physically different from the machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a 'new and useful improvement' of the unprogrammed machine has been, and Congress has said in 35 U. S. C. § 101 that such improvements are statutory subject matter for a patent." (417 F. 2d 1400)

The Court then observed that the vast majority of newly programmed machines might well be held to be obvious to those skilled in the art and hence unpatentable under 35 U. S. C. § 103. With this statement we agree since in each case involving the new operation of a computer, the statutory requirements must be met in respect of novelty and unobviousness.

That the C. C. P. A. rigidly followed not only earlier decisions of this Court, but the intent of Congress is clear from the following statement:

> "We think it is clear that in enacting section 101 Congress meant to exclude principles or laws of nature and mathematics, of which equations are an example, from even temporary monopolization by patent. Accordingly, no rule of law should be announced which would impress a monopoly upon all uses of the equations disclosed by appellants here in their patent application. To allow the claims in issue here would not prohibit all uses of those equations. As we have pointed out above, a member of the public would have to do much more than use the equations to infringe any of these claims. He would have to use them in the physical equipment recited in the claim. Moreover, all machines function according to laws of physics which can be mathematically set forth if known." (417 F. 2d 1399)

The Court concluded that the claimed apparatus was statutory subject matter and some of the claims were patentable over the prior art.[5]

5. It is worth pointing out that IBM had filed an application on similar subject matter prior to the decision in the *Prater and Wei* case. IBM in its Lourie patent 3,529,298 had sought and received claims from the Patent Office of the same type it here contends should be denied to others. We need to cite but one example together with the observation that the graphical design produced bears some resemblance at least to the subjects matter involved in the

2. The Art of Digital Data Communications.

Application of Mahony
421 F. 2d 742 (C. C. P. A. 1970)

In the transmission of a sequence of electrical signals representing a stream of data bits, it is necessary to have synchronization between the sending and receiving terminals. This synchronization, or framing, allows proper identification of the individual words in the stream. This is done by inserting so-called framing bits into the data stream. The identification of these framing bits represented the subject matter on appeal. The decision and Opinion by Judge Lane represents an important clarification in the development of the law.

The principal question decided by the court was whether the appealed claims covered a machine implementation of the process and not mental steps. The court

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5. (Cont'd.)
Bernhart and Fetter appeal. A portion of a selected method claim follows:

> 18. A method of graphically developing a textile weave design from an outline design displayed upon an assumed coordinate grid by operating a data processing system having data storage means and graphic data display means to display arbitrary weave patterns within arbitrarily bounded areas of said outline design, said method comprising the steps of:
>
> operating a portion of said storage means as a weave memory (WM) for assembling stored bits in coordinate arrays representing a plurality of available weave patterns, each having a distinctive arrangement of warp and weft thread crossings; . . . .
>
> operating said display means in accordance with the data stored respectively in said pattern store and said area data table to display in at least some of the rows of said coordinate grid, but only in the positions thereof located within the selected area or areas of said design, graphic symbols representing the thread crossings of each selected weave pattern, excluding from such display any bits of the selected pattern whose symbols would lie outside of the area or areas designated to receive that pattern.

was concerned with the breadth of the claims and used the claims themselves as the yardstick in determining compliance with the Patent Act by asking what they mean to one skilled in the art to which the invention pertains. If they define a machine process in contrast with a mental process, they are statutory.

The court pointed out that the invention could be illustrated by pencil and paper representation, as a method can sometimes be better understood by using an equation interrelating various factors to be utilized in reaching a solution.[6] Nevertheless when the claims call for a "bit stream", recognized dictionaries, such as the Computer Dictionary and Handbook (1966) by Charles J. Sippl, make clear that those skilled in the art use the term bit stream

> ". . . in conjunction with transmission methods in which character separation is accomplished by the terminal equipment, and the bits are transmitted over the circuit in a consecutive line of bits." (421 F. 2d (746)

The Court concluded that in acting on the bits in a bit stream, physical phenomena has been set forth the same as in electrical circuitry where sinusoidal electrical signals are involved.

While one may draw a sine wave representative of such electrical signals, when signals of sine wave form are called for they are again physical in character. Thus it is customary in the electrical arts with reference to electrical signals to talk about chopping, rectifying, filtering

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6. The Court so held in *MacKay Radio and Telegraph Company v. Radio Corporation of America*, 306 U. S. 86, 100 (1939) where this Court found no problem in the use of a formula in defining Carter's radio antenna. The basis for invalidity was Carter's effort during prosecution of the application to modify and broaden the formula to a point where it involved new matter.

and so on. So it is in the computer art. Bit streams and bits, and the manner in which they are operated upon, are just as physical in nature as sinusoidal electrical current which operates electrical motors for the well-being of society.

The court distinguished the *Mahony* case from *Prater and Wei* in that Prater and Wei were seeking to cover only machine executed methods but their method claims were broader than their invention—hence overclaiming.

From the foregoing it will be seen that the court did not open widely the door to the granting of patents. When the court below has been presented with a rejection under Section 112 of the Patent Act, it insisted that each applicant fully comply with the requirements of this section.

3. The Art of Tracking Vehicles.

Application of Hammack, 427 F. 2d 1378 and Application of Hammack, 427 F. 2d 1384 (C. C. P. A. 1970)

The two Hammack applications described the determination of the position and velocity of moving objects, such as aircraft, space vehicles, ballistic missiles, and submarines.

The decisions of July 2, 1970 affirmed the rejection by the Patent Office of all claims on appeal because of indefiniteness and failing to meet the statutory requirements of Section 112.

4. The Art of Seismic Exploration.

Application of Musgrave
431 F. 2d 882 (C. C. P. A. 1970)

The *Musgrave* case may be considered to be a companion case of *Prater and Wei* (both assigned to Mobil Oil Corporation) in that both disclose analog systems for

the practice of the method and for support of broad apparatus claims. The *Musgrave* case dealt with seismic operations and in particular how to obtain better and more useful information about the nature and character of subsurface formations in locating oil fields.

An earlier case, *Application of Naquin*, 398 F. 2d 863 (C. C. P. A. 1968), dealt with the same subject matter. In the *Naquin* case, the Patent Office rejected the claims only on the basis of lack of a complete disclosure meeting the requirements of the first paragraph of Section 112. The computer program had not been disclosed. The court reversed the Patent Office on the basis that the Examiner himself had agreed that the principles of how to program a computer to perform the steps were well known to those skilled in the computer art. It was only necessary to have a flow diagram explaining the particular advance in the art made by Naquin. A complete computer program was not necessary to complete the disclosure since such programming would be well within the skill of the art to produce.

In contrast with Naquin, Musgrave disclosed a fully operative analog system but like Prater and Wei mentioned that one way of carrying out the invention would be to utilize a general purpose computer in place of the analog system. This statement that the process could be carried out by the general purpose computer formed the real basis of rejection by the Patent Office.

The court concluded that the process as a whole, as defined by the claims, did indeed represent subject matter within Section 101. The claims were all to a sequence of steps comprising a process under Section 101. The invention clearly was in the technological arts and thus consonant with the Constitutional purpose to promote the progress of "useful arts".

5. More Seismic Prospecting Art.

Application of Foster
438 F. 2d 1011 (C. C. P. A. 1971)

This application (also assigned to Mobil Oil Corporation) described methods of processing geophysical data to eliminate distortion present in seismograms.

Judge Almond in his Opinion cautioned that one must draft claims which meet the requirements of 35 U. S. C. § 112 in that they must set forth only the machine implemented processes which applicant regards as his invention. When they go beyond this point, the Patent Office correctly rejects them (438 F. 2d 1015). Because of this, the court affirmed the Patent Office as to claims 4, 7-13, and 15-18 but reversed as to claims 1-3, 19, 20, 26 and 27. These latter claims met the requirements both of 35 U. S. C. § 101 and of 35 U. S. C. § 112. Specifically, the court found that the use merely of the word "signals" does not limit the claim to machine implemented processes. A statement that they are "electrical signals", or other language of the art as in Mahony, must be present to make the claims commensurate with the applicants' own definition of what they were seeking to cover. When the claims go beyond that, i.e., overclaiming, the Patent Office position will be affirmed.

6. The Art of Operating Computers.

Application of Ghiron
442 F. 2d 985 (C. C. P. A. 1971)

Ghiron and Ulrich were seeking claims on a method of facilitating transfers dictated by programs for processing data in a computer operating in overlap mode.

The court, Opinion by Judge Baldwin, followed the earlier decisions in respect of insufficiency of disclosure (442 F. 2d 991). Again, the court makes self-evident the

care with which it approaches the problem of patentability in this new and exciting field of endeavor. Apart from the prior art rejection which was reversed, the court found great merit to the position of the Patent Office on the inadequacy of the disclosure as to how one would use a special purpose computer to practice the invention.

7. More Computer Operating Art.

Application of McIlroy
442 F. 2d 1397 (C. C. P. A. 1971)

In the *McIlroy* case, the Patent Office rejection of the claims as drawn to non-statutory subject matter under 35 U. S. C. § 101 was reversed.

The court found that where a process has practical value in enhancing the internal operation of digital computers, the improvement is in the field of technological or useful arts and hence statutory.

8. The Art of Analyzing Data In Computer-Controlled Systems.

Application of Waldbaum
173 U. S. P. Q. 430
(No. 8619, C. C. P. A. April 20, 1972)

This is the last C. C. P. A. decision on programming technology decided at the time of writing this brief.

The C. C. P. A. reversed the Patent Office rejection under 35 U. S. C. § 101.

The opinion is significant for its further clarification of the phrase "technological arts" as used in *Benson and Tabbot* here on appeal and as originally used by the C. C. P. A. in *Musgrave*. The *Waldbaum* opinion makes clear that "technological arts" as used by the C. C. P. A. is synonomous with the phrase "useful arts" as it appears in

the patent clause of the Constitution. This considerably clarifies the issue on appeal here. Is the Benson and Tabbot BCD to binary conversion technique a "technological" or "useful art"? If it is, it meets the constitutional requirement which is all that the statutory language of 35 U. S. C. § 101 is intended to convey.

9. Summary of Section VII of This Brief.

The above decisions are to be contrasted with the positions urged by Petitioner and amicus I. B. M. that the Court of Customs and Patent Appeals, in the aforesaid decisions, has in effect directed the Patent Office to grant patents on scientific principles, mental processes and abstract intellectual concepts. That court has not taken such a position but rather has closely adhered to the standards set forth by this Court.

As shedding further light on the performance of the court below, reference may be had to Appendix II, a comparative table of claims rejected and claims allowed in the several cases before the court involving broadly the technology of program control. The care with which the C. C. P. A. has scrutinized the rejections of the claims presented to it on appeal is well demonstrated by the table.[7]

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7. The Table shows that the Patent Office had allowed the various applicants thirty-nine claims before the cases were appealed to the C. C. P. A. on other claims. In these appeals the C. C. P. A. affirmed the Patent Office on the rejection of one hundred nine claims, of which a disproportionately large number, sixty-four, were in one *Application of Hammack*, 427 F. 2d 1384 (C. C. P. A. 1970). The C. C. P. A. reversed the Patent Office on the rejection of one hundred claims, of which a disproportionately large number, fifty, were in one *Application of Musgrave*, 431 F. 2d 882 (C. C. P. A. 1970).

VIII.

THE ART OF CONVERTING SIGNALS IN BINARY CODED DECIMAL NOTATION INTO ORDINARY BINARY NOTATION.

Application of Benson
441 F. 2d 682 (C. C. P. A. 1971)

The opinion by Judge Rich gives considerable attention to the ground of rejection before the court. The conclusion was that the only ground of rejection relied upon up to the time of the appeal was 35 U. S. C. § 101 (441 F. 2d 684).

Our comments here are limited to a few points which may aid the Court in a better understanding of the subject matter and the limited nature of the decision by the court below.

The conversion of binary coded decimal signals into signals of binary notation is a simple operation. Nevertheless an understanding of what these terms mean and how the conversion is accomplished requires a bit of study. To make this task easier, we include in Appendix V a step-by-step explanation which we hope will prove useful to the Court. The most pertinent prior art referred to in Appendix V was found by the Patent Office. It formed the basis of the rejection of many claims and resulted in cancellation of some claims from the application. Only two claims remain before the Court.

The Commissioner of Patents argues that claim 8 applies to a series of mathematical calculations or mental steps. However, as we read the claim, it is strictly limited to the control of a reentrant shift register in a computer in a manner undisclosed by the prior art to solve a particular problem. There is no possibility of interpreting claim 8 to cover a new mathematical procedure absent the assumed novel operation of a shift register.

There was no rejection by the Patent Office under 35 U. S. C. § 112. The court below found that the rejection of both claims was based solely upon 35 U. S. C. §§ 100, 101. The court found that claim 8 met the requirements of these sections since the claim calls for a method or process performed on the machine disclosed in the patent application, namely a reentrant shift register.

Claim 13 falls within a different category. It was found to be broad enough to cover the machine implementation disclosed in the application, still another machine implementation disclosed during prosecution, and a third manual execution. Because the manual practice would be improbable and lacking in any utility, the court decided that it should realistically be interpreted to cover only the operation and utilization of a machine such as a digital computer, a machine clearly in the technological field and within the definition of "useful arts" rather than the "liberal arts".

The Court, in finding claim 13 directed to statutory subject matter applied a "standard of reasonableness" in claim construction. That standard was laid down by this Court in *United States v. Adams*, 383 U. S. 39 (1966). In the *Adams* case, as here, the Government in its analysis of the claims attempted to ignore the technology and the teaching of the specification. This Court stated:

> "There are several basic errors in the Government's position. First, the fact that the Adams battery is water-activated sets his device apart from the prior art. It is true that Claims 1 and 10, supra, do not mention a water electrolyte, but, as we have noted, a stated object of the invention was to provide a battery rendered serviceable by the mere addition of water. While the claims of a patent limit the invention, and specifications cannot be utilized to expand the patent monopoly, Burns v. Meyer, 100 U. S. 671, 672, 25

L. Ed. 733 (1880); McCarty v. Lehigh Valley R. Co., 160 U. S. 110, 116, 16 S. Ct. 240, 242, 40 L. Ed. 358 (1895), it is fundamental that claims are to be construed in the light of the specifications and both are to be read with a view to ascertaining the invention, Seymour v. Osborne, 11 Wall. 516, 547, 20 L. Ed. 33 (1871); Schriber-Schroth Co. v. Cleveland Trust Co., 311 U. S. 211, 312 U. S. 654, 61 S. Ct. 235, 85 L. Ed. 132 (1940); Schering Corp. v. Gilbert, 2 Cir., 153 F. 2d 428 (1946)." (383 U. S. 48, 49)

In interpreting claim 13, the C. C. P. A. properly concluded that it is not directed to mental activity, abstract concepts, scientific principles, or to an equation *per se* either new or old.

We do not suggest to this Court that an equation *per se*, a program *per se*, a schematic diagram *per se*, or pencil and paper computations are patentable. Where new and unobvious operations are performed on a machine and where the operation of the machine itself is vastly improved by reason of a new and unobvious program, the court below has found patentable subject matter. Accordingly, we submit that the court below has properly accommodated the patent law to the field of computer technology. Its holding of patentability should be sustained.

IX.

THE TACIT APPROVAL BY THE PATENT OFFICE OF THE EARLIER DECISIONS, DISCUSSED ABOVE.

Following the decision of *Prater and Wei* upon Rehearing, the Commissioner of Patents announced[8] that the Patent Office would follow that decision on a case-by-case basis. Though arguments continued to be presented

8. The "Notice of Recission of Guidelines" appeared in 34 F. R. 15724 October 10, 1969.

to the court below in cases where issue had been joined, no petition for certiorari was filed. On the contrary, the Patent Office followed the law of *Prater and Wei*. The *Prater and Wei* patent was duly issued, Appendix III, as was the patent in the *Application of Wheeling*, 413 F. 2d 1187 (C. C. P. A. 1969). (Mobil also owns the Wheeling patent and a representative claim is reproduced in Appendix IV.)

Those active in this field continued to believe the Patent Office had adopted the *Prater and Wei* decision. It was not until the decision in the *Application of Benson* that a petition for certiorari was filed. Amicus strenuously urges that the carefully reasoned decisions of the C. C. P. A. preceding the instant case be left undisturbed. These decisions provide a workable body of law which can be used to determine patentability in this new technology. If this line of decisions is now renounced, the resulting uncertainty will deter, rather than promote, the progress of this useful art.

X.

THIS TECHNOLOGY IS ACCORDED PATENT PROTECTION IN FOREIGN JURISDICTIONS.

Though the patent laws of other countries may differ from our own, and hence decisions of foreign courts on the questions of law presented by the instant case may not be directly relevant, this section of the brief is included because the Brief for Amicus Curiae International Business Machines Corporation asserts that the practice in other countries is to deny patent protection for this subject matter.[9] That this is not so is demonstrated by decisions in the following countries.

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9. Brief for Amicus Curiae International Business Machines Corporation, p. 26.

Great Britain.

In the technological field of computer operations, several cases have been decided in favor of patentability. In two cases the question was carefully considered by the Patent Appeal Tribunal which is presided over by a Judge of the High Court of England.[10] In *Gevers' Application* the invention was a data processing apparatus constructed and arranged with appropriate mechanographic supports so that three steps could be carried out by the machine. The three steps recited in the claims were:

> 1. Entering a succession of words into a computer or other data processing apparatus programmed to translate the words into other words in accordance with a specific rule and to record the translated words on cards or tape;
>
> 2. To sort the cards or words on the tape into lists in one of three enumerated ways;
>
> 3. To print out the list with the words in the original form.

The question presented for review by the Patent Appeal Tribunal was whether there was an invention which fell within Section 101 of the British Patents Act of 1949. Concerning the subject matter defined by the claim, Graham, J. stated:

> "In other words . . . it is fair to say that the claim calls for apparatus which is programmed in a certain way so as to produce the desired result." (page 95)

The Examiner in the Patent Office had rejected Gevers' Application on the basis that "this alleged inven-

10. Badger Company, Incorporated's Application [1970] Pat. Cas. 36 and Gevers' Application [1970] Pat. Cas. 91.

tion would seem to be a scheme or a plan which, although it may be ingenious and useful is not a patentable invention." On this point Mr. Justice Graham stated that what was claimed was a piece of machinery constrained to function a certain way and produce a certain desired result by reason of the program. This was deemed an invention within the meaning of the patent act.

Prior to *Gevers' Application* Mr. Justice Lloyd-Jacob in *Badger Company Incorporated's Application* considered whether an invention involving the use of a computer of known type conditioned to produce a drawing of a piping layout was within Section 101 of the British Patent Act. The finding was affirmative. The *Badger* case, involving as it did a program controlled plotting device, bears strong resemblence to the technology involved in the United States Court of Customs and Patent Appeals decision, *Application of Bernhart*, 417 F. 2d 1395 (C. C. P. A. 1969).

An earlier decision of the Superintending Examiner of the Patent Office in *Slee and Harris's Application*, [1966] Pat. Cas. 194 is in accord with the *Gevers'* and *Badger* cases. In this case, claims to linear programming means for use in controlling data processing apparatus were allowed on appeal.

Canada.

The most recent decision in any of the foreign patent tribunals is that of the decision of the Commissioner of the Canadian Patent Office on December 8, 1971: IN THE MATTER OF *a patent application serial number 961,392.*[11] In this decision, the Chairman of the Patent Appeal Board,

11. The official report is not yet published, but the entire text of the decision appears in 58 Patents, Trademark & Copyright Journal, D-1, December 23, 1971. The rejection of the corresponding application in the U. S. was recently reversed in *Application of Waldbaum*, 173 U. S. P. Q. 430 (No. 8619, C. C. P. A. April 20, 1972).

commenting on the status of the British Patent Office and Patent Appeals Tribunal decisions, said:

> ". . . it is clear to me that both bodies recognize that inventions involving the use of programmed computers are proper subject matter for patent protection. It is also clear to me that although some formalities may have to be observed in drafting claims, there is nothing in the Appeal Tribunal decisions to suggest that inventions involving programmed computers should not satisfy the usual tests of novelty, utility and inventive ingenuity." (page D-2)

The rejections of claims drawn to methods for controlling the operation of a computer, claims to a programmed machine, and claims to the new use of a stored program data processing apparatus were reversed. This decision superseded the previous administrative guidelines of the Canadian Patent Office. See the Canadian Patent Office Records, December 28, 1971, p. 8, which contains new guidelines consistent with the Canadian *Waldbaum* decision.

Federal Republic of Germany.

The use of program-controlled digital computers was considered by the German Federal Patent Court in reviewing an opposition proceeding involving an application of *Philips Electrologica GmbH*, Docket 17 W(pat) 6/68.[12] The opposition was brought by International Business Machines (IBM-Germany)—a subsidiary of Amicus International Business Machines—and a wholly German company—AEG, Telefunken. The invention was for a method of operating a program controlled computer. The introductory portion of claim 1 translates as:

12. The opinion has not yet been published.

"Method for automatically converting one unit of value into another, for example, a nondecimal unit of measurement into decimal within a specified range of tolerance for data processing machines characterized in that the unit of value introduced into a multiplying program controlled computer is, after multiplication by the specified conversion factor, advanced to a first memory store . . ."

The opponents argued that Philips' patent application was not proper subject matter for patent because the invention was a "directive for the intellectual powers" and involved "primarily a question of fixing a calculation method." They argued that the method of claim 1 cannot be classified into one of the known method categories. The German Federal Patent Court distinguished between an invention which may be unpatentable because it is obvious (lacking inventive height) and an invention which could not in the first instance be patentable because it is not proper subject matter for patent. The Court found lack of "inventive height". However, the Court rejected the opponents' contention that the invention was not a technology within the meaning of the patent law. A portion of the opinion translates as follows:

"Thus the subject of the invention satisfies the conditions set before, the subject of the invention is therefore in the field of technology in the sense of the patent system. The technical character of the specified solution is not refuted by the fact that the specified sequence of operations can be carried out without the use of machine parts (with 'pencil and paper')."

Other Countries.

The decisions discussed above in Germany, Canada and Great Britain are the most authoritative thus far on this question.

The three Australian decisions referred to in the brief of Amicus IBM are decisions of the Patent Office Superintending Examiner. These decisions were before the decisions in *Gevers* and *Badger* of the Appeal Tribunal of England. In view of the propensity of the Australian Patent Office to follow British precedents these Australian cases would seem to have questionable vitality. Also, the decisions of the Superintending Examiner appear to depart from the principle laid down by the High Court of Australia in *National Research Development Corporation's Application* [1961] Pat. Cas. 135. The following statement of the court is pertinent here:

> "The point is that a process, to fall within the limits of patentability which the context of the Statute of Monopolies has supplied, must be one that offers some advantage which is material, in the sense that the process belongs to a useful art as distinct from a fine art (see *Virginia-Carolina Chemical Corporation's Application* [1958] R. P. C. 35 at p. 36)—that its value to the country is in the field of economic endeavour." (page 145)

In its brief on Petition for Writ of Certiorari, Amicus IBM pleads that "great weight should be given to the practice in other countries". If this plea is to be honored, the foregoing decisions in favor of the patentability of this new technology should be the standard, and the holding of the court below should be affirmed.

XI.

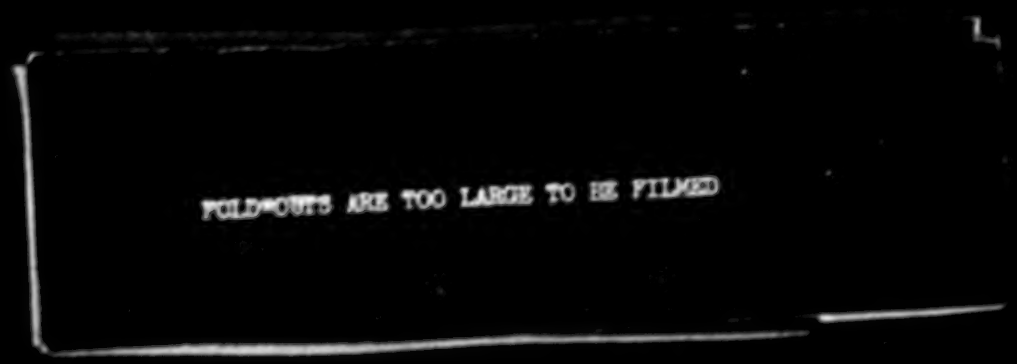
CONCLUSION.

The legal conclusions of the court below are soundly reasoned and consistent with the Constitutional purpose to promote the progress of useful arts. The decision below should in all respects be affirmed.

Respectfully submitted,

VIRGIL E. WOODCOCK,
RICHARD E. KURTZ,
WOODCOCK, WASHBURN, KURTZ & MACKIEWICZ,
1831 The Fidelity Building,
Philadelphia, Pennsylvania. 19109,
Attorneys for Amicus Curiae,
Mobil Oil Corporation.

Of Counsel:
ANDREW L. GABORIAULT,
General Patent Counsel,
OSWALD G. HAYES,
Associate Patent Counsel,
Mobil Oil Corporation,
150 East 42nd Street,
New York, New York. 10017.


FOLD-OUTS ARE TOO LARGE TO BE FILMED

APPENDIX II.

TABLE OF C .C. P. A. COMPUTER PROGRAMMING CASES COMPARING NUMBER OF CLAIMS UPON WHICH REJECTION WAS REVERSED WITH NUMBER ON WHICH REJECTION WAS AFFIRMED.

	No. of Claims Allowed Before Appeal to C.C.P.A.	*No. of Rejected Claims Upon Which the Rejection Was Affirmed by C.C.P.A.*	*No. of Rejected Claims Upon Which the Rejection Was Reversed by C.C.P.A.*
Prater & Wei (1)	0	0	12
Prater & Wei (2)	0	11	1
Wheeling	5	(Case remanded for determination of statutory basis of rejection of five rejected claims.)	
Bernhart & Fetter	0	3	3
Mahony	14	0	2
Hammack (1)	7	12	0
Hammack (2)	0	64	0
Musgrave	6	0	50
Foster et al.	0	12	7
Ghiron & Ulrich	5	7	0
Benson & Tabbot	0	0	2
McIlroy	2	0	8
Waldbaum	0	0	15
	39	109 (45 other than Hammack (2))	100 (50 other than Musgrave)

APPENDIX III.

UNITED STATES PATENT 3,551,658.
PRATER & WEI.

6. The method of determining with minimum error from the spectra of spectral analysis the concentration of the components of a mixture where the components are known and the concentration-determining peaks of the spectral analysis are present in number exceeding the number of said components, which comprises in an automatic processing system the steps of

generating physical representations in said system of the magnitudes of the coefficients of simultaneous linear equations defining the concentrations of said components as functions of the heights of said peaks of said spectral analysis,

generating in said system from said physical representations of the magnitudes of said coefficients the magnitude of the determinant of a plurality of sets of said simultaneous equations, the number of equations of each of said sets being equal in number to the number of said components,

in said system comparing said physical representations of the magnitudes of said determinants of said sets of equations for identification of the set of said equations whose determinant has the largest magnitude, and

generating physical representations of the concentration of each said component of said mixture from said physical representations of the magnitudes of said coefficients of said set of simultaneous equations having said determinant of largest magnitude and from said heights of said peaks included in said last-named set of equations.

APPENDIX IV.

UNITED STATES PATENT 3,564,221.
WHEELING.

4. In optimizing a scalar output function of a system where a set of input values to said system some of which are independently variable, are interrelated, and coact to produce said scalar output function, the method which comprises the following steps:

generating in the system input signals representative of said input values, some of which are independently variable corresponding with said independently variable input values;

generating from said input signals an output signal representative of said scalar output function;

storing in said system an intermediate function representative of said output signals;

changing said variable input signals by amounts of random character to produce output signals of differing magnitude some of which may produce output signals representative of improved scalar output functions;

thereafter repetitively changing said variable input signals by amounts dependent upon random selections; and

weighting the random selections by amounts related to the magnitude of the earlier changes which produced output signals representing improved scalar output functions.

APPENDIX V.

The Benson and Tabbot Invention.

Before considering the Benson and Tabbot method of converting binary coded decimal (BCD) signals to binary signals, the following background of the binary and BCD number notations will be helpful.

The Binary Notation.

In the binary notation, the digits "1" and "0" are placed in positions having values based on sequentially ascending powers of 2 which increase from right to left. The values assigned to these positions are:

128 64 32 16 8 4 2 1

In the binary notation, the number "one" is represented by placing a "1" in the first position and a "0" in all other positions as follows:

128	64	32	16	8	4	2	1	
0	0	0	0	0	0	0	1	"One"

For convenience, the values of the positions are given above each of the binary and BCD numbers.

The number "two" is represented by placing a "1" in the second position and "0's" in all other positions as follows:

128	64	32	16	8	4	2	1	
0	0	0	0	0	0	1	0	"Two"

The number "three" is written by adding the binary number one to the binary number two as follows:

128	64	32	16	8	4	2	1	
0	0	0	0	0	0	1	1	"Three"

The binary number nineteen is written by adding to the binary three a "1" in the position having a value of sixteen:

128	64	32	16	8	4	2	1	
0	0	0	1	0	0	1	1	"Nineteen"

The binary number forty-eight is written as the sum of thirty-two and sixteen as follows:

128	64	32	16	8	4	2	1	
0	0	1	1	0	0	0	0	"Forty-Eight"

The binary number fifty-three is written by adding a binary four and a binary one to forty-eight as follows:

128	64	32	16	8	4	2	1	
0	0	1	1	0	1	0	1	"Fifty-Three"

The Binary Coded Decimal (BCD) Notation.

In the BCD notation, the values assigned to the positions are different but the notation is similar to binary in that the numbers are written by placing a "1" or a "0" in the positions having these values. For example, the BCD number "three" is:

80	40	20	10	8	4	2	1	
0	0	0	0	0	0	1	1	"Three"

Note that the first four positions from the right are assigned the same value as in the binary notation, but that the next four positions have different values. Any number less than ten is the same in both the binary and the BCD notation. For example, the number three is the same in both notations. However, in BCD the number nineteen is different from the binary notation. It is represented by a "nine":

80	40	20	10	8	4	2	1	
0	0	0	0	1	0	0	1	"Nine"

Plus a "ten":

80	40	20	10	8	4	2	1	
0	0	0	1	0	0	0	0	"Ten"

to give:

80	40	20	10	8	4	2	1	
0	0	0	1	1	0	0	1	"Nineteen"

The BCD number "fifty" is written as:

80	40	20	10	8	4	2	1	
0	1	0	1	0	0	0	0	"Fifty"

and the BCD number "fifty-three" is written by adding three to fifty to give:

80	40	20	10	8	4	2	1	
0	1	0	1	0	0	1	1	"Fifty-three"

Converting BCD to Binary.

For many reasons, a change, or conversion, from a BCD number to a binary number is necessary. Consider the pencil and paper technique for converting from BCD to binary.

First, consider the conversion of the BCD number three:

80	40	20	10	8	4	2	1	
0	0	0	0	0	0	1	1	"Three"

into binary form. The reader knows that all numbers less than ten are the same in BCD and binary form so he can merely write the binary number three as follows:

128	64	32	16	8	4	2	1	
0	0	0	0	0	0	1	1	"Three"

Now consider the conversion of the BCD number ten into binary. The BCD number ten is:

80	40	20	10	8	4	2	1	
0	0	0	1	0	0	0	0	"Ten"

The reader knows that the binary number ten is written by a binary eight plus a binary two. The first step in converting the BCD number into binary is to erase, or mask the "1" in the ten's column of the BCD number. This gives:

80	40	20	10	8	4	2	1	
0	0	0	0	0	0	0	0	"zero"

The second step is to add a binary eight to give:

	80	40	20	10	8	4	2	1	
	0	0	0	0	0	0	0	0	
+	0	0	0	0	1	0	0	0	zero plus eight equals "eight"
	0	0	0	0	1	0	0	0	

The third and final step is to add the binary number two to produce:

	80	40	20	10	8	4	2	1	
	0	0	0	0	1	0	0	0	
+	0	0	0	0	0	0	1	0	Binary eight plus binary two equals binary "ten"
	0	0	0	0	1	0	1	0	

As a final example of converting BCD to binary numbers by pencil and paper, consider the conversion of the BCD number fifty-three:

80	40	20	10	8	4	2	1	
0	1	0	1	0	0	1	1	"Fifty-Three"

First, the reader knows that three is the same in BCD and in binary so he will leave unchanged the "1's" in the

first two positions. The next "1" is in the "tens" position. The reader will erase, or mask, this "1" to give:

80	40	20	10	8	4	2	1
0	1	0	0	0	0	1	1

The reader will replace this BCD ten with a binary ten by first adding a binary eight and then adding a binary two as follows. Adding the binary eight gives:

	80	40	20	10	8	4	2	1
	0	1	0	0	0	0	1	1
+	0	0	0	0	1	0	0	0
	0	1	0	0	1	0	1	1

The number being converted plus binary eight equals a number intermediate BCD and binary.

Next, the reader will add binary two as follows:

	80	40	20	10	8	4	2	1
	0	1	0	0	1	0	1	1
+	0	0	0	0	0	0	1	0
	0	1	0	0	1	1	0	1

Number intermediate BCD and binary plus binary two equals new number intermediate BCD and binary

Proceeding to the left, the reader will next convert the "1" in the position having a value of forty from BCD to binary. First, he will erase, or mask, the "1" from this column to give

80	40	20	10	8	4	2	1
0	0	0	0	1	1	0	1

Number intermediate BCD and binary

He will replace this BCD forty with a binary 32 plus a binary eight. First, adding binary thirty-two gives:

	128	64	32	16	8	4	2	1
	0	0	0	0	1	1	0	1
+	0	0	1	0	0	0	0	0
	0	0	1	0	1	1	0	1

Number intermediate BCD and binary plus binary thirty-two equals new number intermediate BCD and binary

Finally, the reader will add a binary eight to give:

128	64	32	16	8	4	2	1
0	0	1	0	1	1	0	1
+ 0	0	0	0	1	0	0	0
0	0	1	1	0	1	0	1

Number intermediate BCD and binary plus binary eight equals binary fifty-three

A digital computer programmer can easily program a digital computer to automatically perform the conversion in exactly the same sequence of steps as that described above. There are other known techniques for converting BCD to binary numbers.* Benson and Tabbot recognized that the known techniques of conversion were wasteful of computer operating time and required a relatively large amount of computer storage capability. They invented a

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* The *Handbook of Automation, Computation and Control*, John Wiley and Sons, Inc., 1959, pages 2-17, suggests a conversion technique essentially similar to that described above. The handbook suggests summing the successive powers of the number expressed in the notation of the system into which the number is being converted. The handbook would convert BCD number 53 into binary by the following steps.

$N_{BCD}=0101 \quad 0011$ BCD fifty-three

$N_{BCD}=0\cdot10^1\cdot2^3+1\cdot10^1\cdot2^2+0\cdot10^1\cdot2^1+1\cdot10^1\cdot2^0+0\cdot10^0\cdot2^3+0\cdot10^0\cdot2^2+1\cdot10^0\cdot2^1+1\cdot10^0\cdot2^0$

$N=1\cdot(1010)\ (0100)+1\cdot(1010)\ (0001)+1\cdot(0001)\ (0010)+1\cdot(0001)\ (0001)$

$N_2=101000+1010+0010+0001=110101$ Binary fifty-three

Another technique for converting from BCD to binary is disclosed in U. S. Patent No. 3,026,035 Couleur. In accordance with this patent the BCD number is placed in a shift register. The BCD number is shifted out of the register one digit at a time. A binary three is subtracted from any decade having a binary count which is equal to or greater than eight after any shifting step. After the shifting is completed, the register contains a binary representation of the BCD number originally read into the register. The Couleur patent was relied upon by the Patent Office in rejecting some of the Benson and Tabbot claims. These claims were cancelled from the application.

computer process which performs the conversion more quickly and with less storage capacity.

The Benson and Tabbot Invention.

Benson and Tabbot perform the same masking and addition steps that were performed in describing the preceeding BCD to binary conversion. The difference is that Benson and Tabbot shift the number to be converted in such a manner that the masking is always performed on the same position (the second) and the addition is always performed on the same position (the first).

The Benson and Tabbot invention can be described by working the conversion with pencil and paper as was done by the reader in the previous section. However, doing the Benson and Tabbot conversion with pencil and paper is somewhat cumbersome; the advantage of their technique is gained only when it is performed on a machine. Therefore, the reader is respectfully cautioned that the following pencil and paper description of the Benson and Tabbot invention will be quite difficult to understand if the basic principles of the examples in the preceding sections are not thoroughly understood.

Benson and Tabbot perform their conversion in a reentrant shift register. A reentrant shift register is a device which shifts the positions of a BCD or binary number. Positions shifted out of one end of the register are inserted into the other end of the register. For example, consider the BCD number fifty-three:

80	40	20	10	8	4	2	1	
0	1	0	1	0	0	1	1	Fifty-Three

If this number is shifted one position to the right in a reentrant shift register, the number can be represented as:

1 0 1 0 1 0 0 1

If the BCD number fifty-three is shifted one position to the left it becomes:

1 0 1 0 0 1 1 0

If the BCD number fifty-three is shifted three positions to the right it becomes:

0 1 1 0 1 0 1 0

Benson and Tabbot convert by masking out each "1" and by replacing the masked out "1" with its binary equivalent. This much is the same as the pencil and paper technique previously described. The difference is that Benson and Tabbot shift the number in their reentrant shift register so that the masking is always performed on the same position and the binary additions are always made to the same position. Consider the example in which the BCD number fifty-three is converted to binary by the Benson and Tabbot method.

The example will be described with reference to the steps of the Benson and Tabbot claim 8. The first step is to store the binary coded decimal number fifty-three in a reentrant shift register so that the positions of this shift register are:

0 1 0 1 0 0 1 1

(2) The positions are shifted to the right by three places to produce:

0 1 1 0 1 0 1 0

(3) The binary "1" in the second position is masked out to produce:

0 1 1 0 1 0 0 0

(4) A binary "1" is added to the first position of the shift register to produce:

0 1 1 0 1 0 0 1

(5) The positions are shifted two places to the left:

1 0 1 0 0 1 0 1

(6) A "1" is added to the first position:

1 0 1 0 0 1 1 0

Thus far, Benson and Tabbot have performed the steps of masking out a "1" and replacing it with a binary eight plus a binary two. These steps were performed in the pencil and paper method of the previous section; however, in the Benson and Tabbot method, the masking was performed on the second position and both additions were made to the first position.

(7) The number is shifted to the right by three places to produce:

1 1 0 1 0 1 0 0

At this point there is a "0", not a "1" in the second position of the reentrant shift register. Therefore, the number is shifted to the right one position at a time until there is a "1" in the second position. Shifting to the right by one position gives:

0 1 1 0 1 0 1 0

Since there is a "1" present in the second position, this "1" is masked out to produce:

0 1 1 0 1 0 0 0

A "1" is added to the first position to produce:

0 1 1 0 1 0 0 1

(5) The number is shifted two places to the left to produce:

1 0 1 0 0 1 0 1

(6) A "1" is added to the first position to produce:

1 0 1 0 0 1 1 0

At this point, the Benson and Tabbot technique has completed the masking of the "1" in the "forty" BCD position and its replacement with a binary "thirty-two" and a binary "eight".

In order to complete the process, the number is shifted to the right by three places to give:

1 1 0 1 0 1 0 0

A test is made to determine if there is a "1" in the second bit position and since there is not, the number is shifted to the right by one position to produce:

0 1 1 0 1 0 1 0

Finally, the number is shifted to the right by one more bit position to complete the conversion:

128	64	32	16	8	4	2	1	
0	0	1	1	0	1	0	1	*Fifty-Three*

The advantage of the Benson and Tabbot technique over the normal conversion is that the masking is always performed on the second position and the addition is always performed on the first position. In the Benson and Tabbot technique, the number is shifted in the shift register so that the masking and addition can be always performed on these positions.